

product features

- Implements complete DVB-T (ETS 300 744) standard
- Fully digital television group (DTG) compliant
- 2K and 8K transmission modes
- All non-hierarchical and hierarchical modulation constellations
- Smart single frequency network channel acquisition
- Decoded transmission parameter signalling (TPS) data can be used and made available to the host CPU
- Integrated ADC
- Internal digital AFC loop (no feedback to tuner)
- Internal digital clock recovery loop (fixed frequency input, no need for VCXO)
- Single pin $\Sigma\Delta$ AGC feedback to tuner
- Channel estimation and correction
- Common phase error correction
- Fast channel acquisition (< 100 ms)
- Maintains and uses channel state information (CSI)
- Serial (I²C compatible) and parallel host interfaces
- Can achieve automatic lock from initial frequency offsets of over 200 KHz
- 6-, 7- and 8-MHz channel support
- MPEG transport stream output suitable for direct connection to transport demux chips
- Minimal host software required (in some cases none)
- 100-pin PQFP
- JTAG boundary scan

OTI-7000

Single-chip Solution for DVB-T Systems

The OTI-7000 is a single-chip coded orthogonal frequency division multiplex (COFDM) demodulator/decoder solution for both 2K and 8K terrestrial digital video broadcast (DVB-T) systems.

Description

The high level of integration that the OTI-7000 offers, along with the ability to sample the incoming signal at a 1st intermediate frequency (IF), makes this device cost effective. In addition, the small package outline ensures that the OTI-7000 is ideal for use in tuner modules.

Input Signal

The OTI-7000 can accept an input signal centered either at a 1st IF of approximately 36.167 MHz (Figure 1) or 2nd IF of approximately 4.57 MHz (Figure 2). This is normally an analog signal, which is sampled using the internal 10-bit ADC. Adjacent channel signals (e.g., NICAM) are removed using digital filters in the OTI-7000. The tuner automatic gain control (AGC) is controlled via a single-pin sigma-delta feedback. This requires only a simple RC filter in order to generate the analog control voltage.

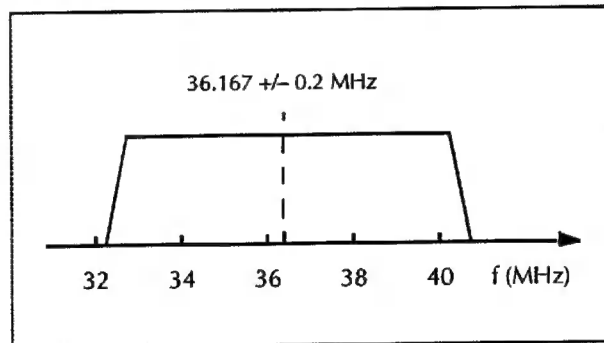


Figure 1: Input Signal Spectrum (1st IF Sampling)

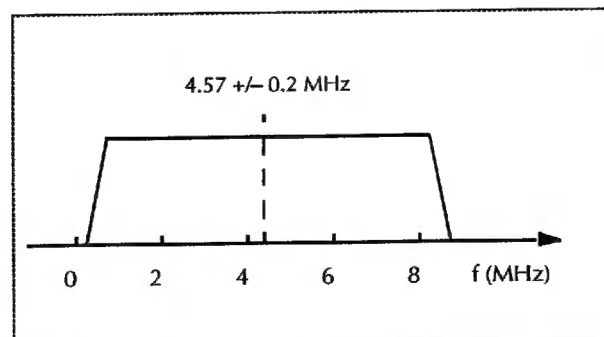


Figure 2: Input Signal Spectrum (2nd IF Sampling)

OTI-7000 Product Brief

Product Description Cont'd.



Functional Description

The OTI-7000 performs all the functions required to produce an MPEG transport stream output from the IF input. The time domain adaptor enables the chip to address 6-, 7-, and 8-MHz bandwidth channels as well as adapting to different IFs, sample timing and frequency offsets. In addition, the time domain adaptor removes adjacent channel interference, such as NICAM, and removes the cyclic prefix prior to the fast fourier transform (FFT). During channel acquisition, the time domain adaptor uses a set of algorithms that allow frequency, sample timing, and guard interval lock to be achieved quickly and reliably before switching to a different set of algorithms, which provide good tracking performance.

After the FFT, a common phase error correction is applied prior to channel estimation and correction. Scattered and continual pilot carriers are used to correct channel distortion, fading, and phase noise within the carrier bandwidth. The channel estimate is also used to provide CSI, which is passed

on to the Viterbi decoder, where it is used to improve performance by identifying bits from data carriers that have been subject to severe fading. CSI can also be used to mask bits from data carriers that are particularly affected by co-channel analog interference (e.g., PAL/SECAM). The OTI-7000 uses proprietary memory-efficient algorithms to produce the channel estimate. By default, the OTI-7000 initially determines all transmission parameters (including 2K/8K transmission mode and guard interval) from the received signal. These parameters are stored and used to reduce the time taken for subsequent channel acquisitions.

The OTI-7000 can be interfaced directly to all commonly available MPEG transport demultiplexor chips as well as directly to a DVB common interface. The data rate is smoothed to remove gaps introduced by the COFDM guard interval and variation in processing time within the forward error correction (FEC) circuitry. This allows a stable clock reference to be extracted from the transport stream more rapidly, further reducing the overall time taken before the viewer sees a picture.

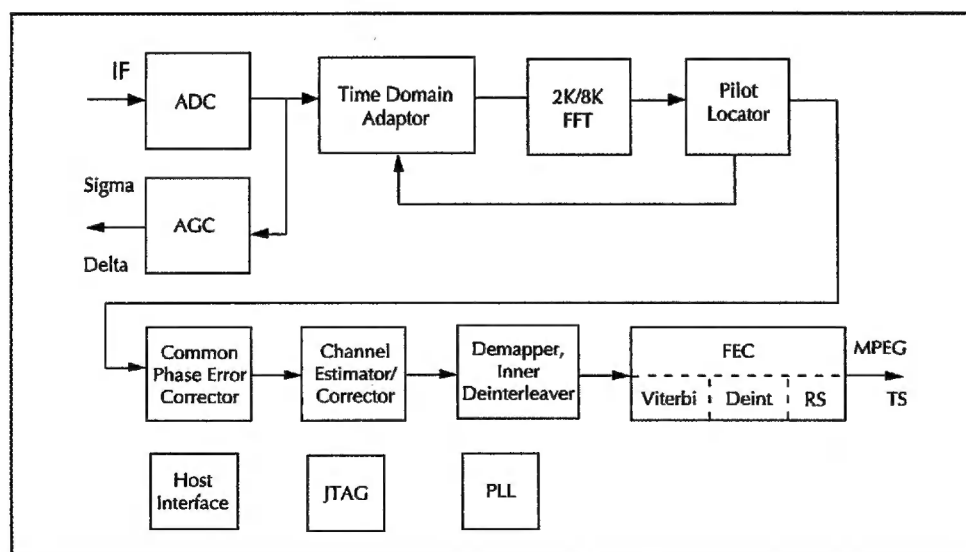


Figure 3: Functional Block Diagram

OTI-7000 Product Brief

Product Applications



Applications

Figures 4 and 5 show two possible applications of the OTI-7000 using a conventional tuner architecture. Figure 4 is an example of 1st IF sampling, where an input signal centered on 36.16 \pm 0.2 MHz is sampled directly. This method reduces the component count in the tuner, allowing a mixer and oscillator to be replaced by an amplifier, which provides the required input level for the ADC. Many standard tuners have an IF output at about 4.57 MHz (32/7 MHz), so the OTI-7000 can also sample a signal centered on this frequency. Selection is made using either a pin on the device (FIRSTIF) or a register. In both cases, adjacent channel interference at the same level as the COFDM signal is removed by digital filtering inside the OTI-7000.

Figures 4 and 5 also show how a two-wire serial-host interface bus to the tuner can be switched inside the OTI-7000. The connection to the tuner is switched on or off by setting a register bit inside the OTI-7000, reducing noise in the tuner caused by activity on the bus.

If no access is required to some of the more advanced features of the OTI-7000, then it can be operated without any connection to a host processor. In this case, some of the pins of the parallel-host interface data bus are used to select the mode of operation (e.g., channel bandwidth, spectrum inversion, and IF sampling). If host processor access is required, please contact Oak Technology for information on drivers and software support.

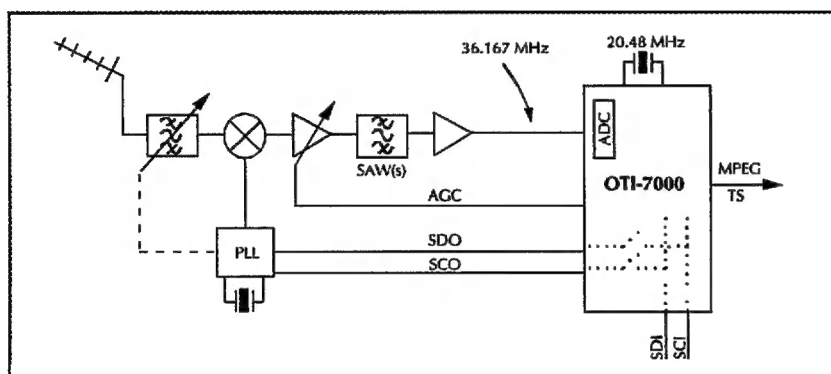


Figure 4: Possible Application (1st Sampling IF)

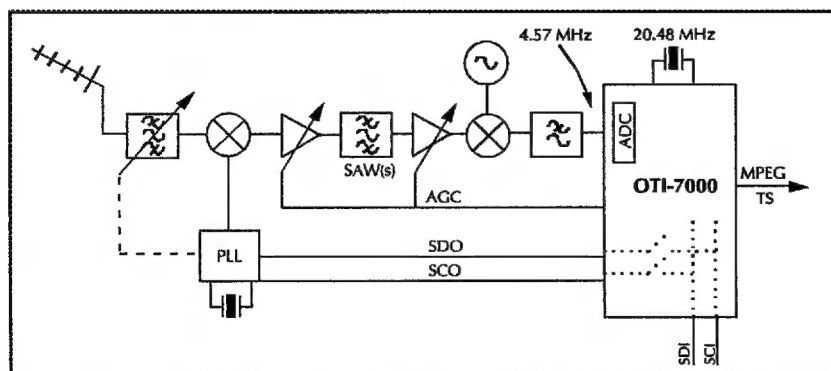


Figure 5: Possible Application (2nd Sampling IF)



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OTI-7000 Pinouts

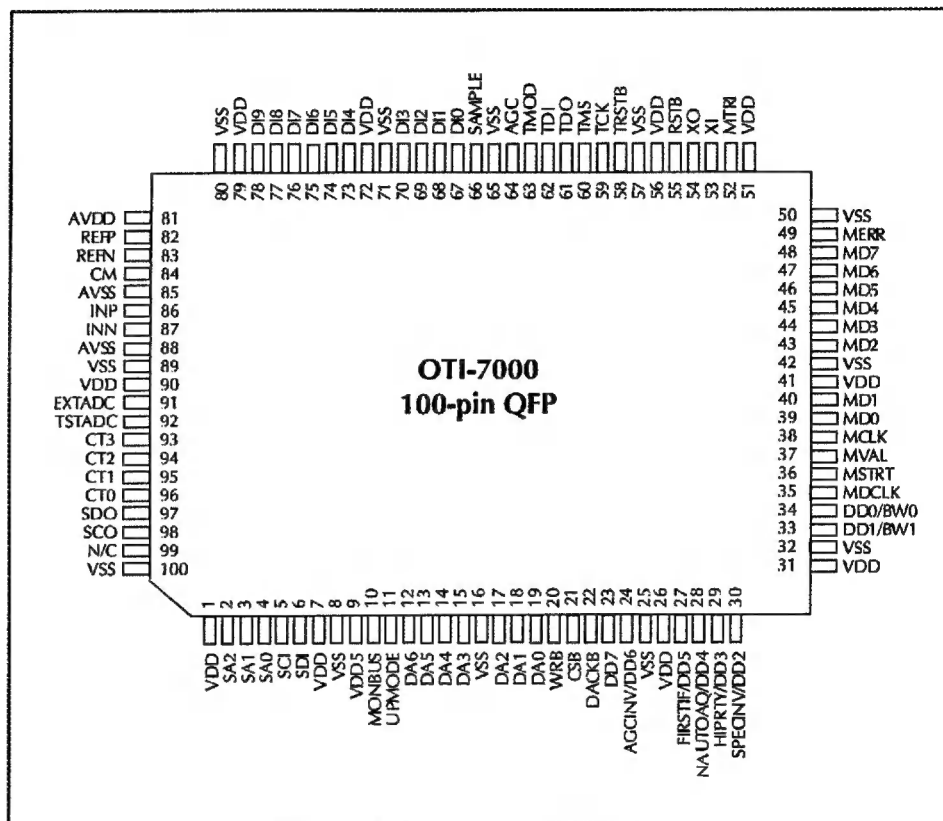


Figure 6: OTI-7000 Pin Diagram

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